I (WE) CLAIM:

1. A method of determining a temperature of an ultrasound transducer, the method comprising:

(a) receiving signals from at least one transduction element of the ultrasound transducer;

(b) determining a temperature-dependent property of the ultrasound transducer from the received signals; and

(c) determining a temperature state of the ultrasound transducer in response to (b).

2. The method of Claim 1 further comprising:

(d) connecting the ultrasound transducer to an ultrasound imaging system, the connection connecting the at least one transduction element to a receive beamformer channel;

wherein (b) comprises determining with components in the ultrasound imaging system, the received signals on connections also used for acoustic imaging signals.

3. The method of Claim 1 wherein (b) comprises measuring a dielectric constant of the at least one transduction element.

4. The method of Claim 3 wherein (b) comprises measuring a change in capacitance of the at least one transduction element.

5. The method of Claim 3 wherein (b) comprises:

(b1) injection a charge onto the at least one transduction element; and

(b2) determining a voltage of the at least one transduction element in response to (b1), wherein (a) comprises receiving the signals in response to (b1).

6. The method of Claim 3 wherein (b) comprises:

(b1) connecting a capacitance bridge to the at least one transduction element;

(b2) applying an oscillating signal to a capacitance bridge; and

(b3) determining values for at least one of: phase, amplitude and combinations thereof from the capacitance bridge in response to (b2), wherein (a) comprises receiving the signals in response to (b2).

7. The method of Claim 3 further comprising:

(d) switchably connecting the at least one transduction element from a receive beamformer to a temperature measurement circuit.

8. The method of Claim 1 wherein (b) comprises determining an acoustic property of a lens or window of the ultrasound transducer.

9. The method of Claim 8 further comprising:

(d) transmitting acoustic energy with a transmit beamformer;

wherein (a) comprises receiving echo signals responsive to (d) and associated with lens or window depths with a receive beamformer.

10. The method of Claim 8 wherein (b) comprises:

(b1) determining, for each of a plurality of elements including the at least one transduction element, a time-of-arrival of acoustic energy; and

(b2) estimating a lens or window acoustic velocity from the times-of-arrival.

11. The method of Claim 8 wherein (b) comprises:

(b1) determining, for each of a plurality of elements including the at least one transduction element, a time-of-arrival of acoustic energy; and

(b2) calculating a difference for each time of arrival from a time-of-arrival profile for a known temperature.

12. The method of Claim 8 wherein (b) comprises determining an amount of attenuation of the lens or window.

13. The method of Claim 1 wherein (c) comprises determining a state above a preset limit.

14. A method of determining a temperature of an ultrasound transducer, the method comprising:

(a) connecting elements of the ultrasound transducer to an ultrasound imaging system; and

(b) determining a temperature of the ultrasound transducer with components in the ultrasound imaging system, the determining being from signals on connections also used for acoustic imaging signals.

15. A system for determining a temperature of an ultrasound transducer, the system comprising:

an input operable to connect with a transducer element of the ultrasound transducer;

a receive beamformer having a channel connectable to the input, the receive beamformer operable to output imaging signals in response to a signal on the input; and

a processor operable to determine a temperature state of the ultrasound transducer in response to a signal on the input.

16. The system of Claim 15 further comprising a releasable connector connected with the input, the releasable connector for connecting with a cable of the ultrasound transducer.

17. The system of Claim 15 further comprising a switch operable to switch the input between the receive beamformer and the processor, the processor operable to measure a change in capacitance of a transducer element connected with the input.

18. The system of Claim 17 wherein the processor comprises a charge pump circuit.

19. The system of Claim 17 wherein the processor comprises a capacitive bridge circuit.

20. The system of Claim 15 wherein the processor connects with the receive beamformer, the processor operable to measuring acoustic property of a lens or window of the ultrasound transducer.

21. The system of Claim 20 further comprising:

a transmit beamformer;

wherein the receive beamformer is operable to receive echo signals responsive to transmission by the transmit beamformer at depths associated with the lens or window.

22. The system of Claim 20 further comprising a look-up table, the processor operable to determine the temperature state from the look-up table.

23. The method of Claim 1 wherein (c) comprises determining temperature with components of the ultrasound transducer that are also used for ultrasound imaging.

24. The method of Claim 1 wherein (c) is performed without added devices in the transducer for temperature measurement.

25. The method of Claim 1 wherein (b) comprises measuring a frequency content of the received signals, wherein (c) comprises determining the temperature state as a function of the frequency content of the received signals.

26. The method of Claim 25 further comprises:

(d) transmitting a waveform with a frequency that varies as a function of time;

wherein (b) comprises measuring a decay in response to (d).

27. The method of Claim 1 wherein further comprising:

(d) performing (b) for a plurality of locations along a lens or window the transducer;

wherein (c) comprises determining the temperature state as a function of the measurements at the plurality of locations.

28. The method of Claim 1 wherein (a) comprises receiving signals associated with multiple firings, and wherein (b) comprises measuring from a combination of received signals from the multiple firings.

29. The method of Claim 1 wherein (a) comprises receiving signals at different apertures, the received signals associated with different firings;

further comprising:

(d) shifting at least a first one of the received signals relative at least a second one of the received signals;

wherein (b) comprises measuring from a combination of at least the shifted first received signal and the second received signal.

30. The system of Claim 15 further comprising a transducer connected with the input, the transducer being free of added devices for temperature measurement.

31. The system of Claim 15 wherein the processor is operable to determine the temperature state as a function of a frequency content of the signal.

32. The system of Claim 15 wherein the processor is operable to determine the temperature state for a plurality of locations along a lens or window of the transducer.

33. The method of Claim 1 further comprising:

(d) initiating a series of actions depending on the temperature state.

34. A method of diagnosing performance or operation of an ultrasound transducer, the method comprising:

(a) receiving signals from at least one transduction element of the ultrasound transducer;

(b) determining a transducer operation-dependent property of the ultrasound transducer from the received signals; and

(c) automatically determining a operation state of the ultrasound transducer in response to (b).

35. The method of Claim 34 further comprising:

(d) connecting the ultrasound transducer to an ultrasound imaging system, the connection connecting the at least one transduction element to a receive beamformer channel;

wherein (b) comprises determining with components in the ultrasound imaging system, the received signals on connections also used for acoustic imaging signals.

36. The method of Claim 34 wherein (b) comprises determining an acoustic property of a lens or window of the ultrasound transducer.

37. The method of Claim 36 further comprising:

(d) transmitting acoustic energy with a transmit beamformer;

wherein (a) comprises receiving echo signals responsive to (d) and associated with lens or window depths with a receive beamformer.

38. The method of Claim 36 wherein (b) comprises:

(b1) determining, for each of a plurality of elements including the at least one transduction element, a time-of-arrival of acoustic energy; and

(b2) estimating a lens or window property from the times-of-arrival.

39. The method of Claim 36 wherein (b) comprises:

(b1) determining, for each of a plurality of elements including the at least one transduction element, a time-of-arrival of acoustic energy; and

(b2) calculating a difference for each time of arrival from a time-of-arrival profile for a known profile.

40. The method of Claim 1 further comprising:

(d) connecting the ultrasound transducer to an ultrasound imaging system, the connection connecting the at least one transduction element to a receive beamformer channel;

wherein (b) comprises determining with components in the ultrasound imaging system, the received signals on connections different than connections used for acoustic imaging signals.